UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,921	03/30/2004	Hiromitsu Yamakawa	25-274	3168

40615 7590 02/27/2007
ARNOLD INTERNATIONAL
P. O. BOX 129
GREAT FALLS, VA 22066-0129

EXAMINER	
PHAM, HAI CHI	
ART UNIT	**PAPER NUMBER**
2861	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/811,921	YAMAKAWA, HIROMITSU	
	Examiner	Art Unit	
	Hai C. Pham	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-5,7,8,11-13,15,16,18 and 20-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-5,7,8,11-13,15,16,18 and 20-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FINAL REJECTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 3-4, 7-8, 11-12, 15-16, 18, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomiyama (JP 2000-249915)3 in view of Imakawa et al. (U.S. 5,671,077).

With regard to claims 3 and 22, Nomiyama discloses a laser array light source (semiconductor laser array 2), a laser array imaging lens comprising, in order from a light-source side, without any intervening lens component, a first lens component (first scanning lens 41) and a second lens component (second scanning lens 42), one lens surface of which is aspheric (the second scanning lens 42 having an aspheric surface), wherein at least one lens surface of the laser array imaging lens is formed with an anamorphic, aspheric surface (either first or second scanning lens 41, 42 is an anamorphic aspherical lens) (English translation, paragraph [0013]).

Nomiyama fails to teach the condition that binds the distance L from the laser array light source to the light-source-side surface of the first lens component of the laser array imaging lens, the distance D_{21} from the image-plane-side surface of the first lens

component to the position where the central rays of the beams from the laser elements intersect the optical axis and the image magnification M.

Imakawa et al. discloses an anamorphic lens (21) being used to focus a laser beam onto the receiving surface of a sensor, the anamorphic lens is disposed at a certain distance from the laser light source such that the converging light beam is focused at the surface of the sensor in accordance with the magnification of the optical system and the distance from the image-plane-side surface of the anamorphic lens to the position where the central rays of the beams from the laser elements intersect the optical axis, e.g. at the surface plane of the sensor. In order to obtain such condition, Imakawa et al. sets the distance d_o from the light emitting surface of the light source to the light-source side of the anamorhpic lens (21) as d_o = 6.667mm, the distance d_2 between the second surface of the anamorphic lens and the light receiving surface as d_2 = 18mm, and the magnification m = 3 (see Example 5 at col. 15) such that:

$$d_o / d_2 \times (1 - 1/m) = 6.667 / 18\ (1 - 1/3) = 0.55558$$

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to dispose the anamorphic lens of Nomiyama at a distance from the light source in accordance with the magnification of the optical system and the distance from the image-plane-side surface of the anamorphic lens to the position where the central rays of the beams from the laser elements intersect the optical axis as taught by Imakawa et al. The motivation for doing so would have been to maintain a desired light amount and beam diameter at the converging point of the light beam as suggested by Imakawa et al.

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Nomiyama by setting the above-mentioned conditions within the range values as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Nomiyama further teaches:

- (referring to claim 4) a stop is positioned on the image-plane side of the first lens component at a specified distance (a stop 43 is located between the first scanning lens 41 and the photoreceptor drum 3, the distance between the exit surface of the first scanning lens 41 and the stop 43 is indicated by the Table 1 as being 72.002 mm) (Fig. 1) (English translation, paragraph [0015]),
- (referring to claims 7-8) a laser array light source (semiconductor laser array 2) having an array of multiple light emitting elements arranged in one or more rows, means (laser actuation circuit 8) for independently modulating the individual light emitting elements of the laser array light source, based on a prescribed signal (the semiconductor laser array 2 having light emitting elements arranged in a two-dimensional array and independently driven based on the image data stored in the image memory 6), and means (drum driving gear 5) for relatively moving a surface to be scanned, that is positioned substantially at an image surface of the laser array imaging lens, in a sub-scanning direction that is roughly perpendicular to the direction of the image dots that form one or more rows at the image

surface (the drum driving gear 5 rotating the drum 3 in the sub-scanning direction perpendicular to the main scanning direction showing as a row across the surface of the drum 3) (English translation [0009]),

- (referring to claims 11-12, 15-16) the first lens component consists of a single lens element (the first scanning lens 41 is a single lens component) (Fig. 1),
- (referring to claims 18, 20) the stop is positioned so that the laser array imaging lens is substantially telecentric on the light-source side (see Abstract).

3. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomiyama in view of Miyoshi et al. (US 5,812,892).

Nomiyama discloses an image forming apparatus comprising a laser array light source (semiconductor laser array 2), a laser array imaging lens having, in order from a light-source side, without any intervening lens component, a first lens component (first scanning lens 41) and a second lens component (second scanning lens 42), one lens surface of which is aspheric (the second scanning lens 42 having an aspheric surface), wherein at least one lens surface among the lens surfaces of the first lens and the second lens component is an aspheric surface (either first or second scanning lens 41, 42 is an anamorphic aspherical lens) (English translation, paragraph [0013]). Nomiyama further teaches means (laser actuation circuit 8) for independently modulating the individual light emitting elements of the laser array light source, based on a prescribed signal (the semiconductor laser array 2 having light emitting elements arranged in a two-dimensional array and independently driven based on the image data stored in the

image memory 6), and means (drum driving gear 5) for relatively moving a surface to be scanned, that is positioned substantially at an image surface of the laser array imaging lens, in a sub-scanning direction that is roughly perpendicular to the direction of the image dots that form one or more rows at the image surface (the drum driving gear 5 rotating the drum 3 in the sub-scanning direction perpendicular to the main scanning direction showing as a row across the surface of the drum 3) (English translation [0009]).

Nomiyama further discloses that the first lens (41) functions to refract light rays that are emitted at the center of each of the luminous flux from each of said light emitting elements so that the light rays crossed the optical axis and intersects in a common region (at the aperture of the stop 43) (Fig. 1). However, Nomiyama fails to teach the second lens component being arranged to receive the light rays that have crossed the optical axis at the common region.

Miyoshi et al. discloses a multi-beam image forming system comprising an array of light emitting diodes (42), a laser array imaging lens having a first lens component (44) and a second lens component (45), wherein the first lens component refracts the light rays that are emitted at the center of each of the luminous flux from each of said light emitting elements (42A) so that the light rays crossed the optical axis and intersects in a common region, and wherein the second lens component (45) is arranged to receive the light rays that have crossed the optical axis at the common region (Fig. 2).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to rearrange the second lens of the device of Nomiyama beyond the common region at which the light rays from the first lens intersect the optical axis as taught by Miyoshi et al. The motivation for doing so would have been to refocus the light rays onto the recording medium.

4. Claims 5, 13 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomiyama in view of Miyoshi et al. and further in view of Harris (U.S. 5,486,694)

Nomiyama discloses an image forming apparatus comprising a laser array light source (semiconductor laser array 2), a laser array imaging lens having, in order from a light-source side, without any intervening lens component, a first lens component (first scanning lens 41) and a second lens component (second scanning lens 42), one lens surface of which is aspheric (the second scanning lens 42 having an aspheric surface), wherein at least one lens surface among the lens surfaces of the first lens and the second lens component is an aspheric surface (either first or second scanning lens 41, 42 is an anamorphic aspherical lens) (English translation, paragraph [0013]). Nomiyama further teaches means (laser actuation circuit 8) for independently modulating the individual light emitting elements of the laser array light source, based on a prescribed signal (the semiconductor laser array 2 having light emitting elements arranged in a two-dimensional array and independently driven based on the image data stored in the image memory 6), and means (drum driving gear 5) for relatively moving a surface to be scanned, that is positioned substantially at an image surface of the laser array imaging

lens, in a sub-scanning direction that is roughly perpendicular to the direction of the image dots that form one or more rows at the image surface (the drum driving gear 5 rotating the drum 3 in the sub-scanning direction perpendicular to the main scanning direction showing as a row across the surface of the drum 3) (English translation [0009]).

Nomiyama further discloses that the first lens (41) functions to refract light rays that are emitted at the center of each of the luminous flux from each of said light emitting elements so that the light rays crossed the optical axis and intersects in a common region (at the aperture of the stop 43), the common region being a point on the optical axis of the first lens component (Fig. 1). However, Nomiyama fails to teach the second lens component being arranged to receive the light rays that have crossed the optical axis at the common region.

Miyoshi et al. discloses a multi-beam image forming system comprising an array of light emitting diodes (42), a laser array imaging lens having a first lens component (44) and a second lens component (45), wherein the first lens component refracts the light rays that are emitted at the center of each of the luminous flux from each of said light emitting elements (42A) so that the light rays crossed the optical axis and intersects in a common region on the optical axis of the first lens component, and wherein the second lens component (45) is arranged to receive the light rays that have crossed the optical axis at the common region (Fig. 2).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to rearrange the second lens of the device of Nomiyama

beyond the common region at which the light rays from the first lens intersect the optical axis as taught by Miyoshi et al. The motivation for doing so would have been to refocus the light rays onto the recording medium.

Nomiyama also fails to teach at least one lens surface of the laser array imaging lens having a diffractive optical element with a phase function either superimposed thereon or is provided as a separate surface.

Harris discloses in Fig. 9 an imaging lens system (300), which combines a refractive toric lens (304), as a second imaging lens, and a binary diffractive optical lens (302), as a first imaging lens, whose diffractive surface having a multi-level structure, which possesses a diffractive phase function to flatten the field curvature of the cross-scan imaging lens (see Abstract and col. 8, line 61 to col. 9, line 2).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide at least one of the scanning lenses of Nomiyama with a multi-level structure diffractive surface having a diffractive phase function as taught by Harris. The motivation for doing so would have been to flatten the field curvature of the cross-scan imaging lens as suggested by Harris.

With regard to claim 13, Nomiyama further teaches the first lens component consisting of a single lens element (the first scanning lens 41 is a single lens component) (Fig. 1).

Response to Arguments

5. Applicant's arguments with respect to claims 3-5, 7-8, 11-13, 15-16, 18 and 20-23 have been considered but are moot in view of the new grounds of rejection.

Conclusion

6. Applicant's amendment, which changed the scope of each of the base claims, necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hai Phan

HAI PHAM
PRIMARY EXAMINER

February 13, 2007